# Gilliam Creek Basin

## Stormwater Management Plan

prepared for

City of Tukwila
Public Works Department

March 2001

# Gilliam Creek Basin
## Stormwater Management Plan

prepared for

City of Tukwila
Public Works Department
6300 Southcenter Boulevard
Tukwila, Washington 98188

prepared by

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**Note:**
Some pages in this document have been purposefully skipped or blank pages inserted so that this document will copy correctly when duplexed.

# Contents

# Tables



# Figures

# Introduction

Gilliam Creek, located within the Green River drainage basin in King County, is one of the few natural stream systems in existence within the city of Tukwila. The Gilliam Creek channel has been fragmented by street crossings, urban development, and filling of wetlands. Currently, surface water runoff within the drainage basin is conveyed through a network of drainage ditches, open stream channels, and underground pipes that do not follow the historical tributary channels.

Although Gilliam Creek has been greatly altered by the impacts of urban development, it continues to provide important ecological, aesthetic, and practical functions. Realizing the importance of this stream system, the city of Tukwila has initiated a program to explore ways of improving water quality and fish habitat in Gilliam Creek.

This basin management plan includes the following elements:

- A description of existing conditions in the Gilliam Creek drainage basin with respect to stormwater runoff characteristics, water quality, and fish habitat
- A set of prioritized recommendations for improving conditions in the basin
- A discussion of alternative funding strategies for implementation of those improvements.

Much of the information contained in this document, with the exception of the final recommendations, was presented in preliminary form in an interim report, *Gilliam Creek Basin, Description of Existing Conditions and Alternatives for Improvement* (Herrera 2000). The recommendations contained in this report are based, in part, on review of that interim document by city of Tukwila staff and interested citizens.

Existing conditions within the basin were evaluated by Herrera Environmental Consultants based on review of previous studies and reports, a stream channel survey, field reconnaissance of the entire basin, collection and analysis of stormwater quality samples, and discussions with city of Tukwila personnel. As a result of an evaluation of potential capital improvement projects conducted by Herrera and RW Beck, recommended projects to improve water quality, flow control, and fish habitat in the basin are presented and prioritized. This basin management plan also addresses programmatic actions the city of Tukwila could take to enhance public awareness of Gilliam Creek and to promote pollution prevention in the basin.

Alternative funding options for the recommended capital improvement projects are discussed with respect to their applicability to the city of Tukwila and the Gilliam Creek drainage basin. The analysis of alternative funding options was prepared by RW Beck, based primarily on review of mechanisms used by other cities in the region.

# Existing Conditions in the Gilliam Creek Basin

## Drainage Basin Description

Gilliam Creek is located within the Green River drainage basin (water resource inventory area [WRIA] #09), and its confluence with the Green River occurs at river mile 12.7 (Williams et al. 1975, see Figure 1). The Gilliam Creek drainage basin (WRIA #09-0032) comprises approximately 1,835 acres, of which 1,535 acres lies within the city of Tukwila and the remaining 300 acres is in the city of SeaTac (Figure 2). The drainage basin is generally rectangular (averaging 1.25 miles wide and 2.25 miles long) with an east/west orientation. Elevations in the Gilliam Creek drainage basin range from 5 feet above mean sea level at the creek's confluence with the Green River to 175 feet above mean sea level at the crest of the McMicken Heights area in the southwest corner of the basin.

The historical Gilliam Creek channel has been fragmented by freeway and city street crossings, residential and commercial development, and filling of wetlands. Currently, surface water runoff within the drainage basin is conveyed through a network of underground pipes, drainage ditches, and open stream channels. The majority of this stormwater conveyance system consists of underground pipes that do not follow the historical tributary channels.

For the purpose of this study, the Gilliam Creek drainage basin has been divided into six subbasins (Figure 2), identified as Southcenter Mall, City Hall, I-5 East, I-5 West, Riverton Heights, and Crystal Springs. A description of each of these subbasins and its location is provided below.

### Southcenter Mall Subbasin

This 200-acre subbasin drains much of the Southcenter Mall area into lower Gilliam Creek. This subbasin is bounded by Interstate 405 (I-405) to the north, Interstate 5 (I-5) to the west, the Green River to the east, and Strander Boulevard to the south. Most of this drainage is conveyed by stormwater pipes into lower Gilliam Creek, which drains into the Green River near the Tukwila Parkway crossing of I-405. This lower reach of Gilliam Creek conveys runoff from the entire drainage basin and is prone to frequent flooding, especially when the Green River water stage is high. Due to the heavily urbanized condition of this subbasin, peak runoff flow rates are high and the runoff from this area contains relatively high concentrations of a variety of pollutants. The Southcenter Mall subbasin corresponds to subbasins 20, 21, 22, and 24 as defined in the *Gilliam Creek Basin Drainage Study* (KCM 1986).

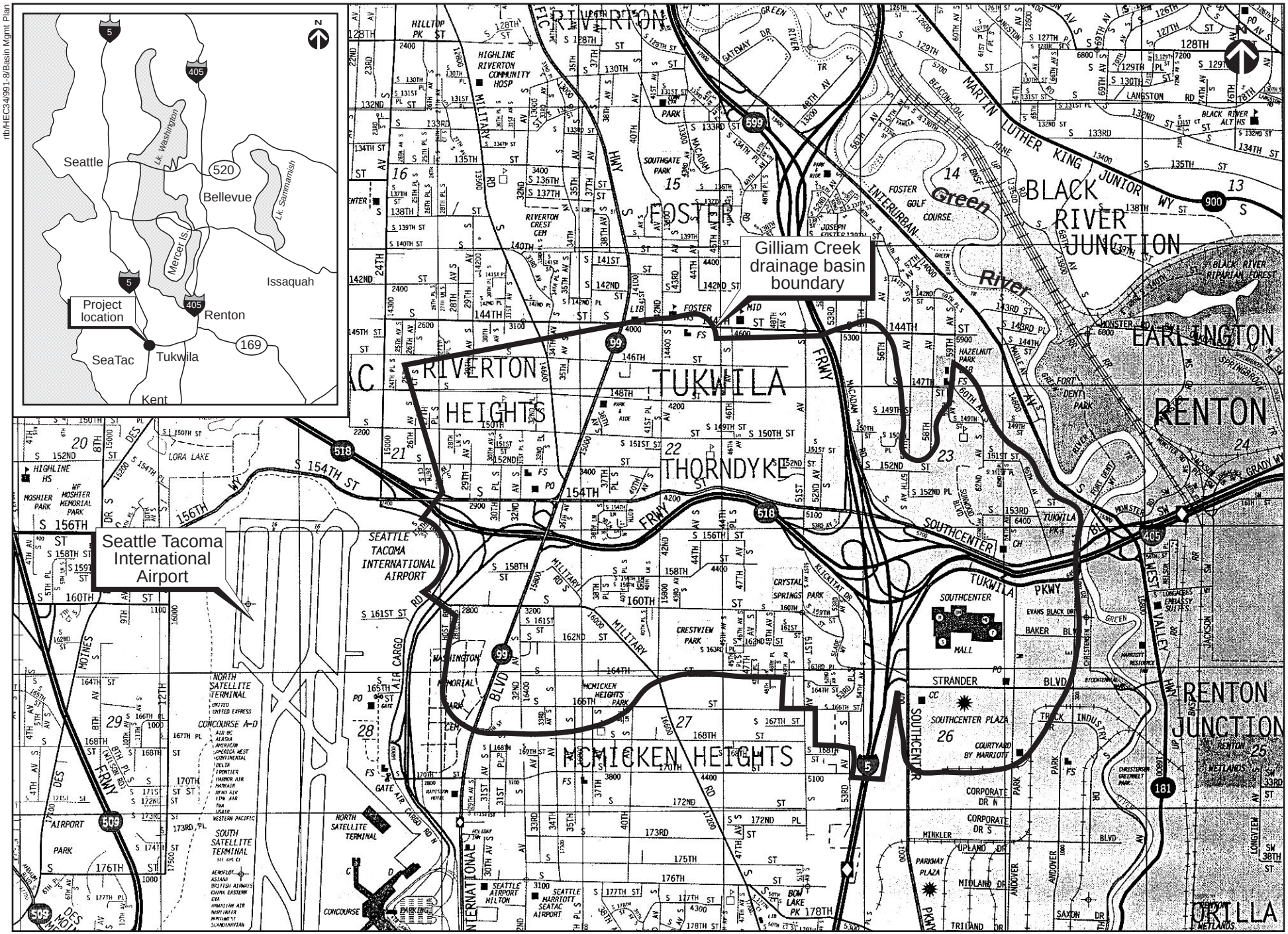


**Figure 1. Vicinity of Gilliam Creek drainage basin, Tukwila, Washington.**

rtb\HEC2\4991-9\Basin Mgmt Plan

**Legend**

- Major streets
- Open channel
- Piped flow
- Subbasin boundary
- Political boundary

0 960 feet
Approximate scale

N

24th Ave S
42nd Ave S
51st Ave S
60th Ave S
144th Street
154th Street
160th Street
166th Street
Military Road
Klickitat Drive
Southcenter Blvd
Green River

99
518
405
5
8

RIVERTON HEIGHTS SUBBASIN
I-5 WEST SUBBASIN
I-5 EAST SUBBASIN
CITY HALL SUBBASIN
CRYSTAL SPRINGS SUBBASIN
SOUTHCENTER SUBBASIN

North Tributary
Northwest Tributary
South Tributary
Southwest Tributary
ponds
wetland
wetland
WSDOT Ponds
ponds
Tukwila Pond

Tukwila City Limits
City of SeaTac

Seattle Tacoma International Airport
Southcenter Mall

HERRERA
ENVIRONMENTAL CONSULTANTS

**Figure 2. Gilliam Creek basin characteristics.**

### City Hall Subbasin

This 136-acre subbasin extends north from I-405 to South 147th Street, and it is bounded on the east by the Green River and on the west by a ridge paralleling Sunwood Boulevard. The headwaters of this subbasin originate near the city of Tukwila Fire Station #52, and there is a small pond in the middle of the subbasin near South 151st Street. Drainage is generally conveyed in this subbasin through pipes, with the exception of open channels in the vicinity of the wetland and Tukwila city hall. Drainage from this subbasin is culverted underneath I-405 into lower Gilliam Creek. The City Hall subbasin corresponds to subbasins 1 and 2 in the *Gilliam Creek Basin Drainage Study* (KCM 1986).

### I-5 East Subbasin

This 138-acre subbasin receives drainage from the western and southern slopes of a ridge paralleling Sunwood Boulevard and from the eastern shoulder of I-5. This subbasin extends north from I-405 to South 144th Street, and there is a large wetland near its headwaters. Drainage in this subbasin is generally conveyed through pipes and is culverted underneath I-405 into lower Gilliam Creek. The I-5 East subbasin corresponds to subbasins 3, 4, and 5 in the *Gilliam Creek Basin Drainage Study* (KCM 1986).

### I-5 West Subbasin

The I-5 West subbasin is situated between the western shoulder of I-5 and 46th Avenue South, and it is bounded on the south by State Route (SR) 518 and on the north by South 144th Street. This 117-acre subbasin has its headwaters near Thorndyke School, and it receives drainage from the eastern slope of a ridge paralleling 46th Avenue South. Drainage is generally conveyed in open channels and ditches in this subbasin, but flow is piped at the downstream end prior to discharge into the pipe carrying the Gilliam Creek main stem flow. Drainage from the I-5 West subbasin enters the main drain line just upstream of the I-5/I-405 interchange. The I-5 West subbasin corresponds to subbasin 7 in the 1986 *Gilliam Creek Basin Drainage Study* (KCM 1986).

### Riverton Heights Subbasin

This 1,002-acre subbasin is the largest of the six subbasins, encompassing 55 percent of the land area of the Gilliam Creek drainage basin. This subbasin is bounded on the west by 24th Avenue South and Seattle–Tacoma International Airport, and on the east by a ridge paralleling 46th Avenue South. The subbasin is bounded to the north by South 144th Street and to the south by a ridge (McMicken Heights). Drainage from this subbasin is conveyed in storm drains to four tributary channels that combine to form upper Gilliam Creek near SR 518. The headwaters of these four tributaries (north, northwest, southwest, and south) are described below.

The north tributary starts near the intersection of SR-99 and South 144th Street. The northwest tributary originates near the intersection of South 148th Street and 26th Avenue South. The southwest tributary begins near the intersection of SR-99 and South 166th Street in the city of SeaTac. The south tributary originates from ground water seeps on a slope near South 156th Street. Upper Gilliam Creek drains east, paralleling the north shoulder of SR 518; the drainage is then culverted under the I-5/I-405 interchange into lower Gilliam Creek.

The Riverton Heights subbasin corresponds to subbasins 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 in the *Gilliam Creek Basin Drainage Study* (KCM 1986). Portions of this subbasin are heavily developed, particularly near the Tukwila International Boulevard corridor. Consequently, peak runoff rates are rapid and the pollutant content in runoff from those areas is relatively high.

### Crystal Springs Subbasin

This 242-acre subbasin receives most of its drainage from ground water seeps on the northeast slope of McMicken Heights. This drainage is culverted underneath I-5 to a drainage ditch that is located between Southcenter Parkway and I-5. This subbasin is bounded on the north by SR 518, on the south and west by the ridge crest of McMicken Heights, and on the east by Southcenter Mall. The Crystal Springs subbasin corresponds to subbasins 18 and 19 in the *Gilliam Creek Basin Drainage Study* (KCM 1986).

## Water Quality Conditions

Gilliam Creek has not been given a specific water quality designation by the Washington Department of Ecology (Ecology). The water quality designation for the stream is therefore determined by its receiving water, the Green River. The Green River is designated as Class A, indicating good overall water quality. Ecology lists the Green River as water quality-impaired with respect to the following parameters: metals, ammonia, fecal coliform bacteria, pH, low dissolved oxygen and high biochemical oxygen demand, and elevated temperatures. There is an abundance of water quality data available for the Green River but very little for Gilliam Creek. Previously collected water quality data are summarized in Table 1 and discussed below.

### Previous Water Quality Sampling Data

A base flow sample was collected by Adolfson Associates, Inc. in June 1995 from the southwest tributary of Gilliam Creek, upstream of the 42nd Avenue crossing (Adolfson 1995). A duplicate sample was analyzed for pH, temperature, dissolved oxygen, dissolved metals, total petroleum hydrocarbons, and pesticides. All parameters were found to meet the Washington state Class A water quality criteria except pH, which was slightly lower than the criterion of 6.5. Pesticides and total petroleum hydrocarbons, for which no state criteria have been established, were not detected in these samples. The sample collection location used by Adolfson is identified in Figure 3.

## Table 1. Historical Gilliam Creek water quality data.

| Date | Location | pH | Temp (°C) | Hardness (mg/L) | DO (mg/L) | $BOD_5$ (mg/ L) | Dissolved Cd (mg/L) | Dissolved Cu (mg/L) | Dissolved Pb (mg/L) | Dissolved Zn (mg/L) | TPH (mg/L) | FOG (mg/L) | TP (mg/L) | $NH_3$ (mg/L) | $NO_3$+$NO_2$ (mg/L) | TSS (mg/L) | Turbidity (NTU) | Fecal Coliform (#/100mL) | Pesticides |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Class A Criteria:** | 6.5-8.5 | <18 | | | >6 | varies w/ hardness | varies w/ hardness | varies w/ hardness | varies w/ hardness | | | | | | | 5 over bkgd | mean <100, >90% of samples <200 | |
| 6/15/95 | 42nd Ave crossing | *6.22* | 11 | | 9.7 | | <0.0002 | <0.002 | <0.001 | 0.022 | <1.0 | | | | | | | | ND |
| 6/15/95 | (Duplicate) | *6.33* | 11 | | 8.9 | | <0.0002 | <0.002 | <0.001 | 0.015 | <1.0 | | | | | | | | ND |
| 9/11/97 | 158th St (upstream-base flow) | 6.76 | 17.5 | 44.7 | *4.5* | 28.5 | | *0.0184* | 0.0022 | 0.012 | 1.4 | 1.4 | 1.52 | 0.012 | 0.025 | 15 | 21 | *est. 1840* | |
| 9/11/97 | (Duplicate) | 6.79 | | 44.7 | | 28.2 | | *0.0182* | 0.0026 | 0.016 | 1.2 | 1.3 | 1.53 | 0.034 | 0.041 | 14 | 20 | *est. 140* | |
| 9/11/97 | 158th St (downstream-base flow) | *6.4* | 14 | 57.4 | *3.2* | 2.56 | | 0.0019 | 0.0051 | *0.128* | <0.25 | <1.0 | 0.145 | 0.136 | 0.07 | 14 | 36 | *440* | |
| 9/11/97 | (Duplicate) | *6.38* | | 57.1 | | 2.56 | | 0.0021 | 0.0052 | *0.119* | <0.25 | <1.0 | 0.378 | 0.133 | 0.064 | 58 | 58 | <2 | |
| 10/30/97 | 158th St (upstream-storm) | 6.73 | 12.7 | 9.38 | 9.5 | <2.00 | | *0.0053* | 0.002 | *0.04* | <0.25 | <1.0 | 0.062 | 0.043 | 0.124 | 3.6 | 6.6 | *460* | |
| 10/30/97 | (Duplicate) | 6.82 | | 10.5 | | <2.00 | | *0.0068* | 0.0032 | *0.072* | <0.25 | <1.0 | 0.06 | 0.036 | 0.127 | 3.6 | 6.8 | *520* | |
| 10/30/97 | 158th St (downstream-storm) | 6.52 | 12.8 | 11.2 | 9.3 | <2.00 | | *0.0068* | 0.0062 | *0.05* | <0.25 | <1.0 | 0.058 | <0.010 | 0.117 | 7.2 | 7.6 | *est. 360* | |
| 10/30/97 | (Duplicate) | 6.51 | | 11.6 | | <2.00 | | *0.0082* | 0.0089 | *0.078* | <0.25 | <1.0 | 0.058 | 0.012 | 0.119 | 6.8 | 7.7 | *est. 320* | |
| 1/5/99 | 158th St (upstream-base flow) | 7.4 | 8.5 | 60.1 | 14.5 | 2.88 | | 0.0053 | <0.001 | 0.027 | 0.33 | 0.46 | 0.096 | 0.395 | 0.242 | 2.8 | 4.5 | *4200* | |
| 1/5/99 | (Duplicate) | 7.28 | 8.5 | 62.7 | 14.8 | 2.26 | | 0.0054 | 0.0015 | 0.029 | 0.28 | 0.4 | 0.162 | 0.366 | 0.274 | 2.8 | 8.5 | *est. 3800* | |
| 1/5/99 | 158th St (downstream-base flow) | 6.76 | 6.9 | 48.4 | 9.6 | <2.00 | | 0.004 | *0.0014* | *0.077* | <0.25 | <0.25 | 0.025 | 0.111 | 0.232 | 2 | 5.5 | est. 8 | |
| 1/5/99 | (Duplicate) | 6.73 | 6.9 | 48.6 | 9.2 | <2.00 | | 0.0045 | 0.0011 | *0.062* | <0.25 | <0.25 | 0.025 | 0.107 | 0.232 | 0.5 | 4.2 | est. 2 | |
| 1/14/99 | 158th St (upstream-storm) | 6.88 | 8.9 | 11.3 | 12.5 | <2.00 | | *0.0032* | <0.001 | *0.032* | 1 | 1.2 | 0.128 | 0.077 | 0.154 | 36 | 25 | *480* | |
| 1/14/99 | (Duplicate) | 6.74 | 9.2 | 13.9 | 10.2 | <2.00 | | *0.0028* | <0.001 | 0.021 | 1.4 | 1.7 | 0.171 | 0.069 | 0.168 | 28 | 23 | *est. 260* | |
| 1/14/99 | 158th St (downstream-storm) | 6.66 | 8.9 | 13.7 | 11.5 | <2.00 | | 0.0026 | 0.001 | *0.025* | 0.58 | 0.69 | 0.063 | 0.05 | 0.157 | 21 | 18 | *est. 220* | |
| 1/14/99 | (Duplicate) | 6.64 | 9 | 12.7 | 11.8 | <2.00 | | 0.0024 | 0.001 | *0.022* | 0.71 | 0.89 | 0.08 | 0.056 | 0.144 | 29 | 23 | *262* | |

*Does not meet Class A water quality criteria*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| DO | dissolved oxygen | Pb | lead | $NO_3$+$NO_2$ | nitrate+nitrite | mL | milliliters |
| $BOD_5$ | 5-day biochemical oxygen demand | TPH | total petroleum hydrocarbons | TSS | total suspended solids | NTU | nephelometric turbidity units |
| Cd | cadmium | FOG | fats, oils, and grease | Pest | pesticides | | |
| Cu | copper | TP | total phosphorus | ND | Not detected (detection limits vary) | | |
| Zn | zinc | $NH_3$ | ammonia | mg/L | milligrams per liter | | |

Shapiro & Associates, Inc. collected storm and base flow samples from two locations on the southwest tributary of Gilliam Creek, immediately south of SR 518 on the eastern side of SR-99 (Shapiro 1997, 1999). The two stations sampled were upstream and downstream from a parking lot stormwater discharge point. Storm samples were collected in October 1997 and January 1999, and base flow samples were collected in September 1997 and January 1999. Duplicate samples were collected at both stations for all events. Samples were analyzed for pH, temperature, hardness, dissolved oxygen, 5-day biochemical oxygen demand, dissolved metals, total petroleum hydrocarbons, fats, oil, and grease (FOG), total phosphorus, ammonia, nitrate+nitrite, total suspended solids, turbidity, and fecal coliform bacteria.

In the base flow samples, parameters that did not meet Washington state Class A water quality criteria were pH, dissolved oxygen, dissolved copper, dissolved lead, dissolved zinc, and fecal coliform bacteria. In the storm samples, parameters that did not meet the water quality criteria were dissolved copper, dissolved zinc, and fecal coliform bacteria. Total petroleum hydrocarbons, fats/oil/grease, total phosphorus, ammonia, nitrate+nitrite, total suspended solids, and turbidity were detected in base flow and storm samples. While Washington state has not established water quality criteria for total phosphorus, ammonia, or total suspended solids, reported values for these parameters and turbidity were found to exceed the median levels and in some cases the maximum levels reported in Seattle area streams (Table 2). Sample collection locations used by Shapiro & Associates are identified in Figure 3.

**Table 2. Water quality values found in Seattle area streams compared to Class A water quality criteria.**

| | Class A Water Quality Criteria | Storm Flow[a] | | | Base Flow[b] | | |
|---|---|---|---|---|---|---|---|
| | | Mean | Minimum | Maximum | Median | Minimum | Maximum |
| Temperature ($^{o}$C) | <18 | – | – | – | 10.6 | 8.0 | 13.5 |
| pH | 6.5–8.5 | – | – | – | 7.5 | 6.9 | 8.2 |
| Dissolved oxygen (mg/L) | >6 | – | – | – | 10.4 | 5.8 | 11.4 |
| Conductivity (µmhos/cm) | | – | – | – | 130 | 53 | 30,900 |
| Hardness (mg/L as $CaCO_3$) | | 47.8 | 19.8 | 90.0 | – | – | – |
| Turbidity (NTU) | <5 over bkgd | 11 | 0.3 | 272 | 1.8 | 0.7 | 17 |
| Total suspended solids (mg/L) | | 24 | 1.2 | 1,092 | 3.4 | 1.6 | 13 |
| Total phosphorus (mg/L) | | 0.121 | 0.006 | 0.985 | 0.048 | 0.013 | 0.150 |
| Ammonia nitrogen (mg/L) | | 0.037 | 0.010 | 1.700 | 0.015 | < 0.005 | 0.190 |
| Nitrate+nitrite nitrogen (mg/L) | | 0.638 | 0.160 | 1.900 | 0.630 | 0.07373 | 3.000 |
| Copper (mg/L) | Varies w/hardness | 0.005 | < 0.001 | 0.014 | – | – | – |
| Lead (mg/L) | Varies w/hardness | 0.002 | < 0.001 | 0.007 | – | – | – |
| Zinc (mg/L) | Varies w/hardness | 0.019 | < 0.004 | 0.068 | – | – | – |
| Fecal coliform bacteria (No./100 mL) | Geometric mean <100, less than 10% of samples >200 | 1,992 | 2 | 14,700 | 100 | 7 | 900 |

[a] Storm flow statistics are based on eight grab samples collected from 23 stream stations in the metropolitan Seattle area; mean values are geometric means (Metro 1994).
[b] Base flow statistics are based on 23 monthly grab samples collected from 50 stream stations in the metropolitan Seattle area (Metro 1994).

mg/L milligrams per liter
µmhos/cm micromhos per centimeter
$CaCO_3$ calcium carbonate
NTU nephelometric turbidity units
No./100 mL number of colonies per 100 milliliters.

rtb\HEC34\91-8\Basin Mgmt Plan

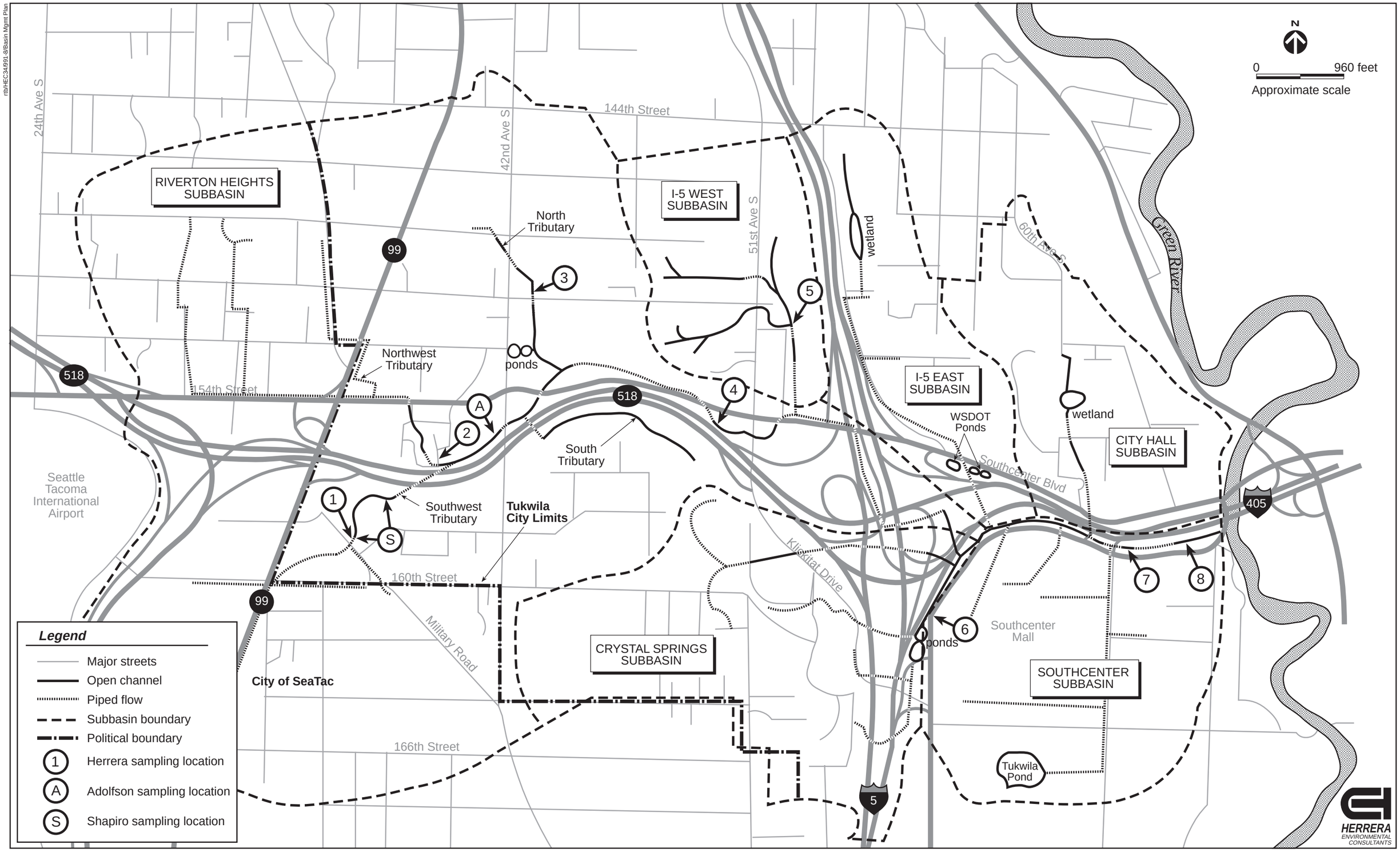


**Figure 3. Gilliam Creek water quality monitoring stations.**

## Current Water Quality Sampling Data

Additional water quality samples were collected for the present study at eight locations within the Gilliam Creek basin. The purpose of this sampling effort was to identify the specific portions of the basin that are the greatest contributors to water quality degradation. At each of the eight sites, single grab samples of runoff from three storm events were collected and analyzed for total suspended solids, fecal coliform bacteria, dissolved metals (copper, lead, and zinc), and hardness. Temperature, pH, conductivity, dissolved oxygen, turbidity, and stream discharge were measured using field instruments. Field measurements and laboratory analytical results for the water quality samples are summarized in Table 3. Sample collection stations are identified in Figure 3.

Fecal coliform bacteria concentrations exceeded the Class A water quality criterion (geometric mean of 100 colony-forming units [CFU] per 100 milliliters [mL]) in all but two samples collected. Consistently higher fecal coliform levels were seen at sampling stations 2, 3, 4, 7, and 8. Water quality samples at several of the stations exceeded the Class A criterion for dissolved copper, which varies with hardness of the sampled water. Samples at stations 1 and 2 exceeded this criterion for all three storm events, while samples from stations 3, 4, 6, and 8 exceeded the criterion during one event. Dissolved lead was not detected in any of the water quality samples. Dissolved zinc was present at levels above the Class A criterion (which varies with hardness) at station 1 for all three sampling events and at station 2 for one event. Temperature, pH, and dissolved oxygen results were within Class A criteria for all samples except at station 1. In the first storm event sampled at station 1, the pH level was slightly lower than the minimum Class A criterion.

Turbidity and total suspended solids levels were elevated in water quality samples at all Gilliam Creek basin locations. While there is a Class A water quality criterion for turbidity, it is defined as 5 nephelometric turbidity units (NTU) above the background level, and no background value has been developed for the sampling stations used in the present study. Turbidity and total suspended solids levels therefore have been evaluated in relation to mean values found in Seattle-area urban streams during storm flow (Metro 1994). The mean turbidity value reported by Metro (1994) was 11 NTU. Turbidity levels in all samples collected during the first two storm events exceeded this mean value. Turbidity levels during the third storm event were lower, exceeding 11 NTU in samples from five of the eight stations. Total suspended solids levels exceeded the mean value reported by Metro (24 mg/L) in more than half of the samples collected from the first two storm events. Only one sample during the third storm event exceeded this mean value (station 2). Consistently higher turbidity and total suspended solids values were seen at stations 1, 2, and 4, while station 6 had consistently lower values.

Stream discharge rates account for some of the variations in water quality results between storm events and between stations during a single storm event. The timing of the recent sample collection effort with respect to the storm runoff hydrograph led to this variation in discharge rates. The flow measurements obtained at the various sampling stations occurred over a period of several hours and in that time the runoff may have changed from the rising limb of the hydrograph to the falling limb (i.e., before peak to after peak). This variation is most evident at station 4 during the first storm event and at stations 7 and 8 during the second event.

## Table 3. Gilliam Creek water quality sampling results compared to Class A water quality criteria.

| Sample Location | Sample Date | Discharge (cfs) | Temperature (deg C) | pH | Conductivity (µmhos/cm) | Dissolved Oxygen (mg/L) | Turbidity (NTU) | Hardness (mg/L) | TSS (mg/L) | Fecal Coliform (#/100mL) | Dissolved Cu (mg/L) | Dissolved Pb (mg/L) | Dissolved Zn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class A Criteria** | | | <18 | 6.5–8.5 | | >6 | 5 over bkgd | | | mean <100, >90% of samples <200 | varies w/ hardness | varies w/ hardness | varies w/ hardness |
| **Storm 1** | | | | | | | | | | | | | |
| Gilliam 1 | 10/27/99 | 1.6 | 10.4 | 6.80 | 72.3 | 12.9 | 27.9 | 23.3 | 61 | *700* | *0.0136* | <0.0010 | *0.102* |
| Gilliam 2 | 10/27/99 | 2.4 | 9.8 | 6.86 | 42.5 | 13.4 | 46.6 | 23.5 | 58 | *1280* | *0.008* | <0.0010 | *0.037* |
| Gilliam 3 | 10/27/99 | 0.5 | 10.0 | 7.27 | 61.4 | 12.9 | 53.5 | 23.1 | 44 | *420* | *0.0068* | <0.0010 | 0.004 |
| Gilliam 4 | 10/27/99 | 14.8 | 9.7 | 7.17 | 70.6 | 12.7 | 88.4 | 27.4 | 168 | *5800* | *0.0067* | <0.0010 | 0.017 |
| Gilliam 5 | 10/27/99 | 0.4 | 8.5 | 7.04 | 234.0 | 10.5 | 33.0 | 93.2 | 37 | *180* | 0.0042 | <0.0010 | 0.009 |
| Gilliam 6 | 10/27/99 | 1.4 | 10.5 | 7.66 | 181.8 | 13.0 | 21.4 | 70.9 | 19 | *2400* | *0.0087* | <0.0010 | 0.018 |
| Gilliam 7 | 10/27/99 | 6.1 | 10.3 | 7.47 | 136.7 | 12.1 | 23.2 | 52.8 | 20 | *3200* | 0.0057 | <0.0010 | 0.011 |
| Gilliam 8 | 10/27/99 | 6.7 | 10.2 | 7.38 | 103.1 | 12.9 | 31.4 | 42.0 | 31 | *6400* | *0.0062* | <0.0010 | 0.014 |
| **Storm 2** | | | | | | | | | | | | | |
| Gilliam 1 | 11/5/99 | 2.8 | 9.4 | 6.78 | 54.3 | 13.5 | 51.1 | 16.4 | 62 | *780* | *0.0088* | <0.0010 | *0.033* |
| Gilliam 2 | 11/5/99 | 0.6 | 10.1 | 7.00 | 66.5 | 13.0 | 30.0 | 29.3 | 18 | *6200* | *0.0054* | <0.0010 | 0.018 |
| Gilliam 3 | 11/5/99 | 0.1 | 9.6 | 7.38 | 123.9 | 12.6 | 17.4 | 52.2 | 13 | *5600* | 0.0029 | <0.0010 | <0.003 |
| Gilliam 4 | 11/5/99 | 5.3 | 9.7 | 7.38 | 118.1 | 13.8 | 29.8 | 52.4 | 31 | *3600* | 0.0045 | <0.0010 | 0.01 |
| Gilliam 5 | 11/5/99 | 0.3 | 8.2 | 6.94 | 222.0 | 10.3 | 32.9 | 93.4 | 32 | 88 | 0.0028 | <0.0010 | 0.007 |
| Gilliam 6 | 11/5/99 | 3.2 | 9.9 | 7.45 | 128.0 | 14.0 | 19.7 | 55.3 | 16 | 76 | 0.0049 | <0.0010 | 0.006 |
| Gilliam 7 | 11/5/99 | 21.6 | 9.9 | 7.30 | 91.0 | 14.1 | 18.9 | 37.7 | 25 | *124* | 0.0048 | <0.0010 | 0.009 |
| Gilliam 8 | 11/5/99 | 36.0 | 9.9 | 7.20 | 69.3 | 14.1 | 25.7 | 27.4 | 33 | *920* | *0.004* | <0.0010 | 0.009 |
| **Storm 3** | | | | | | | | | | | | | |
| Gilliam 1 | 11/19/99 | 1.2 | 10.2 | *6.39* | 55.0 | 10.5 | 27.0 | 18.4 | 20 | *720* | *0.0076* | <0.0010 | *0.031* |
| Gilliam 2 | 11/19/99 | 0.9 | 10.4 | 6.59 | 66.0 | 10.4 | 24.0 | 23.6 | 34 | *4800* | *0.0048* | <0.0010 | 0.016 |
| Gilliam 3 | 11/19/99 | 0.4 | 11.0 | 7.00 | 198.1 | 9.4 | 7.8 | 79.2 | 19 | *1100* | 0.0011 | <0.0010 | <0.003 |
| Gilliam 4 | 11/19/99 | 4.1 | 10.2 | 7.24 | 160.9 | 10.7 | 22.0 | 67.0 | 30 | *980* | 0.0031 | <0.0010 | 0.007 |
| Gilliam 5 | 11/19/99 | 0.3 | 9.4 | 6.83 | 244.0 | 8.6 | 7.7 | 103.0 | 7.2 | *300* | 0.0013 | <0.0010 | 0.008 |
| Gilliam 6 | 11/19/99 | 0.8 | 10.8 | 7.34 | 218.0 | 10.3 | 9.9 | 94.4 | 8.3 | *500* | 0.0029 | <0.0010 | 0.006 |
| Gilliam 7 | 11/19/99 | 10.8 | 10.2 | 7.24 | 168.0 | 10.2 | 17.0 | 68.2 | 20 | *960* | 0.0029 | <0.0010 | 0.008 |
| Gilliam 8 | 11/19/99 | 9.0 | 10.6 | 7.14 | 168.0 | 9.9 | 17.0 | 69.4 | 17 | *660* | 0.0023 | <0.0010 | 0.009 |

*Does not meet Class A water quality criteria*

| | | | | | |
|---|---|---|---|---|---|
| cfs | cubic feet per second | mg/L | milligrams per liter NH | mL | milliliters |
| (µmhos/cm) | micromhos per centimeter | NTU | nephelometric turbidity units | | |

The results of the recent monitoring effort provide a good starting point for understanding the water quality characteristics and problems of Gilliam Creek. Sample results indicate that the Gilliam Creek tributaries conveying stormwater from the highly developed areas along SR-99 (represented by sampling stations 1 and 2) are experiencing the greatest water quality degradation. These conditions are less apparent in the lower reaches of the basin, but the highly developed commercial areas around Southcenter Mall are likely contributing similarly high levels of stormwater pollutants. Dense residential development in other portions of the drainage basin is also partially responsible for the degraded water quality in Gilliam Creek.

## Drainage Conditions

Most of the Gilliam Creek drainage basin consists of highly developed urban land uses, including single- and multifamily residential areas, commercial and office areas, and roadway surfaces. These types of urban land uses are characterized by large areas of impervious surfaces associated with roads, parking lots, sidewalks, and rooftops. Impervious surfaces convey rainfall to receiving waters much more quickly than do pervious land areas such as undeveloped forest and open space, causing increased peak flows and runoff volumes. This is evident in Gilliam Creek, where scour and erosion characterize the upper reaches of the stream, resulting in sediment deposition and flooding in the lower reaches. These problems of upstream erosion and downstream sedimentation are exacerbated by the topography of the basin, which has relatively steep stream channel slopes in the upper basin and a flat channel gradient in the lower basin.

The Gilliam Creek basin has few large stormwater detention facilities capable of reducing peak flows in the stream. A two-cell stormwater detention and treatment pond located at South 152nd Street and 42nd Avenue South discharges to the north tributary of Gilliam Creek. Several ponds located in the I-5 East and City Hall subbasins, while not designed as detention ponds, may provide some amount of flow control. Undersized culverts and pipe inlets at two locations in the main stem of Gilliam Creek also provide some degree of incidental flow control as stream water backs up in these areas during large storm events. These undersized inlets are the 42nd Avenue South culvert and the pipe inlet just downstream of the confluence with the north tributary of Gilliam Creek (KCM 1993).

In recent years, development projects have been required to incorporate stormwater detention facilities in their drainage systems in order to comply with city of Tukwila code requirements. In 1995, through ordinance 1755 (Tukwila Municipal Code chapter 14.30), Tukwila adopted the design criteria set forth in the 1990 King County *Surface Water Design Manual* to guide drainage design at development sites throughout the city. This section of the municipal code also adopts subsequent amendments to the King County manual; consequently, the 1998 update to the King County manual is now being applied to drainage design throughout Tukwila. The city of SeaTac also has up-to-date stormwater management requirements in effect, having adopted the 1998 revision of the King County *Surface Water Design Manual* (SeaTac Municipal Code chapter 12.10). As a result, individual development sites are achieving peak flow reduction in many areas of the basin.

Although these small detention systems provide improvements in comparison to areas without any flow control, the net effect on peak flows in Gilliam Creek is collectively minor. The creek continues to suffer from excessive peak flows generated throughout the basin. In recent years, since both cities enacted formal stormwater management requirements, no large projects incorporating stormwater controls on a regional scale have been developed. Consequently, major reductions in peak flows from substantial portions of the drainage basin have not been realized.

# Fish Habitat Conditions

Fish habitat within the Gilliam Creek watershed is restricted to open-channel segments in the lower reach downstream of I-5. This lower reach, totaling 2,900 feet in length in the Southcenter Mall and Crystal Springs subbasins, has been fragmented by urban development. Fish have not been found in any of the remaining segments of open channel within the watershed. Degraded water quality and high flows in the creek have significantly altered the natural channel habitat that once existed. Fish species occurrence and habitat conditions in Gilliam Creek are described below.

### Fish Species Presence

Anadromous fish species reported to occur in lower Gilliam Creek include chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and sea-run cutthroat trout (*O. clarki clarki*) (Partee 1999 personal communication). Other anadromous fish that may occur in lower Gilliam Creek include Pacific lamprey (*Entosphenus tridentatus*) and river lamprey (*Lampetra ayresi*) (Wydoski and Whitney 1979).

Resident fish species expected to occur in Gilliam Creek include cutthroat trout *(O. clarki)*, western brook lamprey (*L. richardsoni*), and sculpin (*Cottus* sp.). Resident fish species that may occur in Gilliam Creek, based on their geographic distribution and habitat requirements, include longnose dace (*Rhinichthys cataractae*), speckled dace (*R. osculus*), largescale sucker (*Catostomus macrocheilus*), and three-spine stickleback (*Gasterosteus aculeatus*) (Wydoski and Whitney 1979).

### Anadromous and Resident Fish Habitat

The only reach of Gilliam Creek that is accessible to anadromous fish is located along the south shoulder of I-405 between the Green River and I-5. This is also the only reach in which resident fish have been observed. This reach alternates between open channels and culverted segments that extend from the confluence with the Green River to the eastern edge of the I-5 right-of-way. Access to this reach is restricted by a large flap gate at the outlet of a culvert where Gilliam Creek drains into the Green River. This flap gate controls flows in a 9-foot-diameter culvert underneath Tukwila Parkway, just upstream of I-405. Fish can pass upstream through this flap gate only when the Green River water stage is high (but lower than the Gilliam Creek stage) and when there is sufficient discharge from Gilliam Creek to force the flap gate open enough for fish passage. The occurrence of these conditions is limited; consequently, anadromous fish access to the lower reach of Gilliam Creek is far from optimal.

Potential salmon spawning and rearing habitat in the lower reach of Gilliam Creek consists of four segments of open channel separated by four corrugated metal pipe culverts. The culverted sections include a 9-foot-diameter culvert under Tukwila Parkway, a 9-foot-diameter culvert under the south shoulder of I-405, a 78-inch-diameter culvert under an on-ramp to I-405, and a 72-inch-diameter culvert under the overpass between Southcenter Boulevard and Tukwila Parkway. None of these culverts presents a migration barrier to returning adults, but during high discharge the culverts may act as barriers to juvenile fish.

Available fish habitat in the lower three segments of open channel in this reach is characterized by a straight channel confined by steep banks. The dominant habitat types include low-gradient riffles, dammed pools, lateral scour pools, and runs. The wetted channel width averages 12 feet, the average depth in riffles is 6 inches, and the average depth of pools is 2 feet. Substrate in the stream channel is dominated by sand and silt in pools, and gravel and cobbles in riffles. The available spawning gravels are embedded with 20 percent fines. Riparian vegetation on both banks consists of mature deciduous forest dominated by black cottonwood (*Populus balsamifera*) and red alder (*Alnus rubra*) in the tree layer, while the shrub layer is dominated by Himalayan blackberry (*Rubus discolor*), Indian plum (*Oemleria cerasiformis*), snowberry (*Symphoricarpos albus*), and salmonberry (*Rubus spectabilis*). There is a moderate amount of large woody debris that forms lateral scour pools. Spawning habitat is limited by the lack of gravels and silt embeddedness, while juvenile rearing habitat is limited by the lack of off-channel refuge and cover typically provided by undercut banks, riparian vegetation, and channel diversity.

Available fish habitat in the upper segment of open channel in this reach, between the I-5/I-405 interchange and a culvert beneath the overpass connecting Tukwila Parkway and Southcenter Boulevard, is characterized by a narrow meandering channel, unconfined banks, and a wide floodplain. The dominant habitat types in this segment are low-gradient riffles, runs, and lateral scour pools. The average wetted width is 10 feet, the average depth of riffles is 3 inches, and the average depth of pools is 1 foot. Substrate in the streambed is dominated by sand and silt, with lesser amounts of small gravel. The floodplain benches on both banks are vegetated by Sitka willow (*Salix sitchensis*), reed canarygrass (*Phalaris arundinacea*), small-fruited bulrush (*Scirpus microcarpus*), horsetail (*Equisetum* sp.), and common cattail (*Typha latifolia*). Riparian vegetation higher on the banks consists of black cottonwood, red alder, Himalayan blackberry, and salmonberry. Spawning habitat is limited by the lack of gravels and silt embeddedness, while juvenile rearing habitat is limited by the shallow pool depth and lack of large woody debris.

## Summary of Existing Problems

As described in the previous sections, a variety of water quality, flooding, and habitat problems are evident in the Gilliam Creek basin, ranging from basin-wide problems to site-specific issues. Appendix B summarizes the problems identified in this study and in previous studies that have not yet been rectified, along with potential improvement projects associated with these problems. The following section discusses capital improvement projects and programmatic actions that are recommended for the Gilliam Creek basin.

# Recommended Capital Improvement Projects and Programmatic Actions

This section presents a summary of capital improvement projects that are recommended to address drainage, water quality, and habitat problems in the Gilliam Creek basin. A prioritization scheme is introduced and applied to the recommended projects. Finally, a discussion is provided on additional programmatic actions (i.e., actions other than capital improvements) that are recommended for enhanced protection of Gilliam Creek and downstream waters.

## Recommended Improvement Projects

A number of potential capital improvement projects were developed and analyzed during the course of this study. This section discusses those projects that are recommended for inclusion in the city of Tukwila capital improvement program. A summary of all of the potential capital improvement projects that were analyzed, along with an explanation of the potential projects that were dropped from consideration, is provided in Appendix B.

Some of the recommended improvement projects have been identified in previous documents and are revisited here. Others were developed as a part of this study. All improvement projects were analyzed to determine feasibility and potential benefit to the Gilliam Creek system. Cost estimates were also developed for the recommended improvement projects. Project summaries in the form of fact sheets are included in Appendix C, along with supporting technical analysis data for the recommended projects.

Table 4 summarizes the recommended capital improvement projects, including estimated costs and priority designation. Geographical locations of the recommended improvement projects are displayed in Figure 4.

## Prioritization of Improvement Recommendations

The recommended improvement projects listed in Table 4 are described in an interim report entitled *Gilliam Creek Basin, Description of Existing Conditions and Alternatives for Improvement* (Herrera, 2000). City of Tukwila staff and interested citizens were given the opportunity to review the potential improvements and provide comments on preferred projects. Based on these comments and additional analysis of environmental benefits and costs, priority rankings were applied to the proposed improvement projects to guide future implementation.

## Table 4. Recommended capital improvement projects for the Gilliam Creek basin.

| Project | Location | Proposed Capital Improvement | Estimated Cost | Relative Priority (4–18) |
|---|---|---|---|---|
| D1 | Gilliam Creek outlet to Green River | Construct 250-cfs (cubic feet per second) pump station with fish passage facilities. | $3,200,000 (includes 15-cfs pump station in D6) | 7 |
| D2 | Between 40th Ave S and 42nd Ave S | Construct in-stream ponds and biofiltration swale. | $300,000 | 12 |
| D3 | Andover Park W | Replace undersized pipe. | $370,000 | 9 |
| D4 | North of S 154th St and east of 42nd Ave S | Construct regional in-stream detention pond. | $220,000 | 17 |
| D5 | Strander Blvd near Andover Park E | Replace undersized pipe. | $215,000 | 7 |
| D6 | James Christensen Rd | Construct 15-cfs pump station with fish passage facilities. | See D1 | 7 |
| D9 | 54th Ave S between Slade Way and S 166th St | Upgrade existing ditch and construct detention facility. | $905,000 | 7 |
| D10 | S 146th St from Military Rd S to SR-99 | Replace undersized pipe. | $320,000 | 7 |
| D16 | Intersection of 42nd Ave S and S 146th St | Construct detention or detention/treatment ponds. | $266,000 | 12 |
| D19 | 52nd Ave S and S 154th St | Construct detention/ treatment pond | $598,000 | 9 |
| D20 | South side of S 154th St, near SR-99 | Construct biofiltration swale. | $57,000 (does not include land purchase/easement costs) | 8 |
| D22 | Near intersection of Old Military Rd and S 158th St | Construct regional detention pond. | $730,000 | 12 |
| D23 | SR-99 between S. 146th St and S. 152nd St | Construct underground detention tanks. | $159,000 per site; up to 6 sites | 10 |
| D24 | SR-99 between S 146th St and S 152nd St | Construct underground water quality treatment vaults. | $80,000 per site; up to 6 sites | 11 |
| H1 | Section of north tributary between 150th St S and 152nd St S | Reinforce channel bed and bank. Construct log check dams in channel, and place riprap on weak bank sections. | $475,000 | 10 |
| H2 | Outlet of Gilliam Creek to Green River | Construct fish ladder leading to existing flap gate, and replace flap gate with self-regulating tide gate. | $650,000 | 14 |
| H3 | Along Tukwila Parkway between I-5 culvert and outfall to Green River | Implement channel modifications to improve habitat. Widen stream channel, install large woody debris and riparian vegetation, and increase sinuosity where appropriate. | $294,000[a] | 11 |
| H4 | Southwest corner of 42nd Ave S and S 48th St | Plant riparian vegetation. | $5,500 | 10 |
| H5 | South of S 154th St near 52nd Ave S intersection | Plant riparian vegetation. | $17,000 | 10 |
| H6 | Along Tukwila Parkway west of 61st Ave S between I-5/I-405 ramp and Southcenter Parkway | Construct pond at confluence of main stem and tributary for fish habitat enhancement, water quality treatment, and flood storage. | $131,000 | 11 |

Notes:
See Table 5 for listing of projects in order of relative priority
a This cost applies to modifications to all open channel segments in lower Gilliam creek.
The cost to modify individual segments would be generally proportional. See Appendix C.

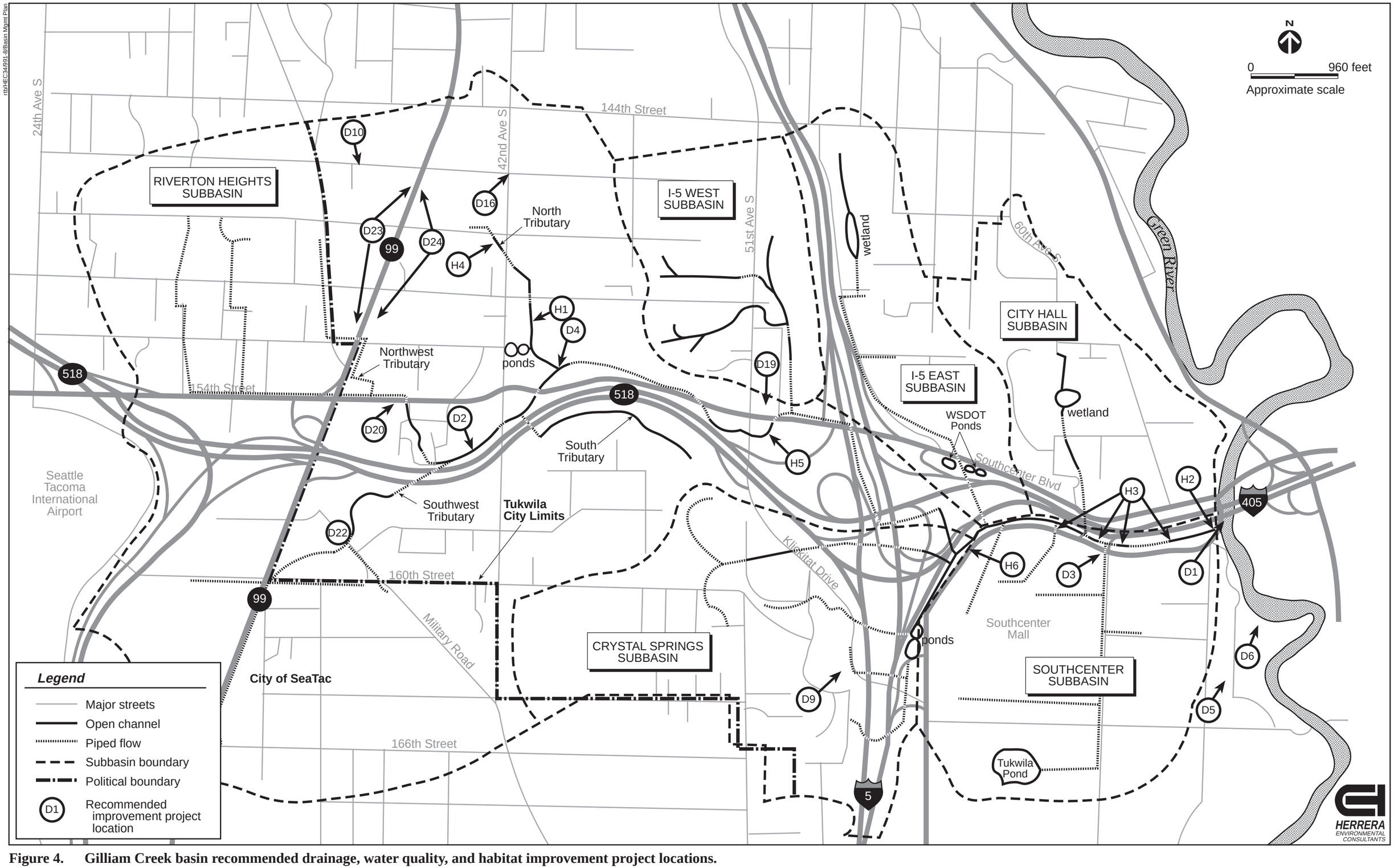


**Figure 4. Gilliam Creek basin recommended drainage, water quality, and habitat improvement project locations.**

## Priority Level Determination

Priority rankings assigned to the proposed Gilliam Creek drainage basin improvements were based on four criteria: 1) city of Tukwila comments; 2) potential ease of permitting; 3) environmental benefit; and 4) cost effectiveness. A range of numerical values was applied to each category, and the scores in all four categories were summed to produce an overall prioritization score.

### *City of Tukwila Comments*

City of Tukwila staff comments were solicited after copies of the interim report were distributed. Citizen comments were solicited through a public meeting at which the proposed improvements were presented. This public meeting, conducted at Tukwila city hall on March 29, 2000, was attended by only three Tukwila residents. While comments and concerns were communicated by city staff regarding the proposed projects, there was very little citizen input.

Based on city staff comments, a score of 1 to 5 was applied to each recommended project. A low score (1) was applied to projects the city deemed useful but not of near-term importance. A high score (5) was applied to projects the city is clearly interested in implementing in the near future. An intermediate score (3) was applied to projects for which no indication was given.

### *Potential Ease of Permitting*

Potential ease of permitting was considered for each recommended project, based on the project's likely impact upon fish-bearing streams, wetlands, and steep slopes, as well as the associated implications for involvement by several regulatory agencies.

A score of 1 to 3 was applied to each project for ease of permitting. A low value (1) was applied to projects for which permits are required from multiple agencies, where this could cause significant delays in project implementation. An intermediate value (2) was applied to projects for which permits are required from agencies outside the city, where this would not be expected to delay or complicate the project significantly. A high value (3) was applied to projects for which the only permits required are those administered by the city.

### *Environmental Benefit*

The determination of environmental benefit for each project is based, where applicable, on the amount of watershed runoff that would be treated or detained. The rating of environmental benefit for habitat projects is based on improvement of fish usage of Gilliam Creek.

A score of 1 to 5 was applied to each project for environmental benefit. A low score (1) was applied to projects that would result in very little improvement in peak flow reduction, water quality, or fish habitat in Gilliam Creek. A high score (5) was applied to projects that would result in a significant improvement to any of these three objectives. Intermediate scores (2

through 4) were applied to various projects based on the relative degree of environmental improvement that could be accomplished, short of significant improvement.

### *Cost Effectiveness*

Cost effectiveness was determined for each project based on the estimated cost relative to the expected environmental benefit. A score of 1 to 5 was applied to each project for cost effectiveness. A low score (1) was applied to costly projects that would provide minimal environmental benefit to Gilliam Creek. A high score (5) was applied to relatively inexpensive projects that would provide a significant benefit. Intermediate values (2 through 4) were applied to relatively inexpensive projects that would provide moderate benefits, and to costly projects that would provide greater benefits.

### *Overall Priority Ranking*

To determine the overall priority level for each recommended improvement project, a total score was calculated from the individual criteria. The lowest possible score was 4 and the highest possible score was 18; a project scoring intermediate values for each category would have a total score of 11. Table 5 shows the priority scoring values of the recommended improvement projects listed in descending order, from the highest to the lowest priority projects.

## Programmatic Actions to Enhance Protection of Gilliam Creek

In addition to the variety of capital improvements that could be undertaken to improve water quality, flooding, and habitat conditions in Gilliam Creek, the city should consider several programmatic actions for enhanced protection of Gilliam Creek. The following paragraphs briefly describe these actions.

### Pollution Source Control Program for Targeted Businesses

As discussed in the existing conditions section of this report, runoff originating in and near the SR-99 corridor contributes extensively to downstream problems in Gilliam Creek. This portion of the basin contains numerous businesses that do not have stormwater control systems on their sites, and that are not likely taking proactive steps to minimize stormwater pollution on their sites. Some of the newer businesses may have stormwater treatment and detention systems on their sites as a result of the city's adoption of stormwater management requirements in recent years, but older businesses almost certainly do not. Some of these businesses may be required to implement pollution prevention measures under the state's National Pollutant Discharge Elimination System (NPDES) permit program (certain classifications of industrial sites have been targeted for permit coverage). However, many other businesses are not required to take action under existing regulations. It is unlikely that runoff conditions will improve in the near future at a given business site unless the site is significantly redeveloped, thereby invoking requirements to retrofit stormwater treatment and detention facilities in accordance with current city standards.

**Table 5. Priority level determination for recommended Gilliam Creek improvement projects.**

| Project | Proposed Improvement | City of Tukwila Comments (1–5) | Potential Ease of Permitting (1–3) | Environmental Benefit (1–5) | Cost Effectiveness (1–5) | Total Score (4–18) |
|---|---|---|---|---|---|---|
| D4 | Construct regional in-stream detention pond | 5 | 2 | 5 | 5 | 17 |
| H2 | Construct fish ladder and replace flap gate at outfall | 5 | 1 | 5 | 3 | 14 |
| D2 | Construct in-stream ponds and biofiltration swale | 3 | 2 | 4 | 3 | 12 |
| D16 | Construct detention or detention/treatment ponds | 3 | 3 | 3 | 3 | 12 |
| D22 | Construct regional detention pond | 1 | 2 | 5 | 4 | 12[b] |
| D24 | Construct underground water quality treatment vaults | 1 | 3 | 4 | 3 | 11 |
| H3 | Implement channel modifications to improve habitat | 1 | 2 | 4 | 4 | 11 |
| H6 | Construct pond for fish habitat, treatment, and flood storage | 1 | 2 | 4 | 4 | 11 |
| D23 | Construct underground detention tanks | 1 | 3 | 4 | 2 | 10 |
| H1 | Reinforce channel bed and bank | 3 | 2 | 3 | 2 | 10 |
| H4 | Plant riparian vegetation | 1 | 3 | 2 | 4 | 10 |
| H5 | Plant riparian vegetation | 1 | 3 | 2 | 4 | 10 |
| D3 | Replace undersized pipe | 3 | 3 | 1 | 2 | 9 |
| D19 | Construct detention/treatment pond | 1 | 3 | 3 | 2 | 9[a] |
| D20 | Construct biofiltration swale | 1 | 3 | 2 | 2 | 8 |
| D1 | Construct 250 cfs pump station | 3 | 1 | 2 | 1 | 7 |
| D5 | Replace undersized pipe | 1 | 3 | 1 | 2 | 7 |
| D6 | Construct 15 cfs pump station | 3 | 2 | 1 | 1 | 7 |
| D9 | Upgrade existing ditch and construct detention facility | 1 | 3 | 2 | 1 | 7 |
| D10 | Replace undersized pipe | 1 | 3 | 1 | 2 | 7 |

[a] This project was given a low priority despite its higher score due to the possibility of property development at this location.
[b] This project was given a low priority despite its higher score due to planned property development at this location.

The city should inventory the businesses in the SR-99 corridor, prioritize those that present the greatest potential for adverse stormwater problems, and work with those targeted businesses to achieve meaningful improvements. Much of this effort would focus on identification and implementation of source control best management practices (BMPs) that are tailored to the business activity and site conditions. Examples of source control BMPs include employee education regarding pollution prevention and waste minimization, frequent cleaning and maintenance of waste storage and disposal areas, frequent sweeping of parking lots, providing covers or containment devices for waste storage and disposal areas, and relocating activities that pollute stormwater runoff under cover. Several jurisdictions in western Washington have

developed source control BMP manuals that could serve as references. The city's coordinated efforts with targeted businesses would require conducting a meeting with representatives of each business, assisting the business with development of effective BMPs, and conducting follow-up visits to the business site as necessary to ensure that the BMPs are being implemented and to help troubleshoot implementation problems.

This type of partnering with businesses to achieve pollution reduction could also be applied in other areas of the Gilliam Creek basin, particularly in the Southcenter area. Because the Southcenter area drains to the lower reach of Gilliam Creek, where the benefits of reduced pollution in stormwater runoff would have less effect on the creek due to the short distance to the outlet at the Green River, this area should be targeted after the SR-99 corridor has been addressed. Improvements in stormwater quality in the Southcenter area would also benefit the Green River downstream of the Gilliam Creek outlet.

### BMP Handbooks

In combination with the business partnering effort described above, the city should develop a handbook summarizing BMPs that can be applied in various situations to improve stormwater quality. The handbook could identify various types of source control and treatment BMPs, provide examples of business practices and site conditions where they would apply, and offer recommendations on cost-effective ways to implement them. A further step in this effort should be development of a BMP handbook for residences, focusing on BMPs applicable to gardening and lawn care, automobile washing and maintenance, painting and refinishing activities, and waste storage and disposal.

### Public Notice of Updates on Basin Plan Implementation

*The Hazelnut* offers a convenient means of informing residents and businesses in the city about stormwater-related problems in the Gilliam Creek basin, actions that are being taken to improve upon those problems, and the status of progress in improving conditions. A similar recommendation was provided in the basin plans for the Fostoria and Riverton Creek basins (Herrera 1996; Entranco et al. 1997), but *The Hazelnut* has yet to be used as a forum for discussion of these types of issues.

### Locational Signage for Gilliam Creek and Its Tributaries

Signs along roadways offer a simple and effective means of educating the public about the presence of streams and the need for public stewardship of them. The city has already fabricated several signs indicating creek crossings, but not all of these have yet been posted. These signs should be posted as soon as possible in the Gilliam Creek basin (and elsewhere in Tukwila).

### Storm Drain Stenciling

Another simple and cost-effective means of educating the public about the presence of streams and the effects of pollutants in stormwater runoff involves posting storm drain inlets with notices such as *DUMP NO WASTE; DRAINS TO GILLIAM CREEK*. A stencil is used to paint the pavement adjacent to the storm drain inlet. Although the city has promoted stenciling of storm drains in other areas through the use of volunteers and school groups, this effort has not focused attention in the Gilliam Creek basin. To enhance public awareness of pollution problems in Gilliam Creek, the city should promote similar storm drain stenciling efforts in the Gilliam Creek basin.

### Increased City Staff Resources to Implement Programmatic Actions

Some of the previous recommendations for stormwater-related programs in Tukwila have not been carried out because of limited staff availability. The city should consider hiring additional staff in the Public Works Department to carry out the recommendations listed above, as well as similar recommendations listed in the *Fostoria Basin Stormwater Quality Management Plan* (Herrera 1996) and the *Riverton Creek Stormwater Quality Management Plan* (Entranco et al. 1997).

# Funding Options Analysis

During development of the Gilliam Creek Stormwater Quality Management Plan, a review of the city of Tukwila stormwater utility funding sources was conducted. This was done, in part, because anticipated and new demands on the surface water utility, such as fulfilling the requirements of the federal Endangered Species Act and NPDES Phase II regulations, will require additional efforts in stormwater control to improve water quality and protect and restore fish habitat. This will likely increase the needs in all areas of stormwater management, including operation and maintenance, engineering, and capital improvements. In anticipation of these increased demands, consideration should be given to other sources of revenue for the stormwater program. The task of this financial element included a meeting with city staff to review the city's current methods for generating stormwater revenue and funding capital projects, as well as identifying other secondary funding source options and considering approaches used by other jurisdictions.

## Current Stormwater Funding Program

Tukwila currently funds its stormwater program with a combination of utility service charges, state grants and loans, interlocal coordination, and permit fees. These funding sources are discussed separately below.

### Stormwater Utility Revenue

The city's primary funding source for the existing stormwater program is a storm and surface water utility that was established in 1989 (Ordinance 1523). The revenues collected by the utility are used to fund the planning, construction, operation and maintenance, and improvement of the utility facilities, both natural and constructed. The revenues are also used to pay debt service on loans used for capital improvements.

The methodology for the original formation of the city's storm and surface water utility is described in Appendix K of the *City of Tukwila Surface Water Management Comprehensive Plan* (KCM 1993). While this document is dated 1993, most of the work of the utility formation was done prior to or during 1989. The storm and surface water utility is a stand-alone entity, set up as an enterprise fund, within the governmental structure. It is defined as being financially and organizationally self-sufficient, and is designed to furnish a comprehensive set of services related to management of surface water quantity and quality.

A utility rate and service charge is imposed on every property parcel within the city, including those owned by the city and the Washington State Department of Transportation. The service charge is based upon the contribution of surface water runoff to the system, as defined by the estimated percentage of developed surface area of the property. Developed surface area is defined as surfaces that have altered the natural infiltration or runoff patterns and increase

stormwater runoff. Developed single-family residential parcels are grouped together into one rate category and pay a specified service charge per parcel. The current categories and annual rates are given in Table 6.

**Table 6. Stormwater utility year 2000 service rates.**

| Rate Category | Monthly Service Charge (per acre) | Monthly Service Charge (per parcel) |
|---|---|---|
| 1. Natural | $ 0.54 | – |
| 2. 0 – 20% developed surface | $ 1.16 | – |
| 3. 21 – 50% developed surface | $ 2.13 | – |
| 4. 51 – 70% developed surface | $ 3.18 | – |
| 5. 71 – 85% developed surface | $ 3.83 | – |
| 6. 86 – 100% developed surface | $ 4.47 | – |
| 7. Single-family residential parcels | – | $4.33 |

The above rates were established in a 1999 rate increase. Even with the rate increase, the city's current rates are below the rates of many jurisdictions within the region. For comparison, Table 7 gives rates of other jurisdictions for single-family residential parcels.

**Table 7. Comparison of area surface water utility service rates for a typical single-family residence (November 2000).**

| Location | Monthly Rate |
|---|---|
| Redmond | $11.50 |
| Mercer Island | $10.35 |
| Bellevue | $9.19 |
| King County | $7.09 |
| Burien | $7.09 |
| Des Moines | $6.42 |
| Seattle | $6.06 |
| Olympia | $6.00 |
| Bothell | $5.56 |
| Auburn | $5.50 |
| Mukilteo | $5.40 |
| Renton | $5.23 |
| Kirkland | $5.00 |
| SeaTac | $5.00 |
| Tukwila | $4.33 |
| Edmonds | $3.70 |
| Kent | $2.44 |

### Grants and Loans

The city, where possible, uses grants or loans to supplement the storm and surface water utility revenues. The city has successfully obtained Public Works Trust Fund (PWTF) low-interest loans for capital improvements, as well as Washington Department of Ecology (Ecology) Centennial Clean Water Fund (CCWF) grants for basin water quality studies. Additional information on grant and loan programs is discussed later in this section.

### Interlocal Coordination

Some of the drainage infrastructure within the city of Tukwila is actually owned and operated by others through an interlocal agreement. The city of Tukwila is a member of the Green River Basin Program and Interlocal Agreement (GRIA). Members of the Green River Basin Program signed an interlocal agreement dated June 30, 1992, which sets forth policies and regulations to coordinate Green River Basin Program activities. The members of the Green River Basin Program include King County and the cities of Tukwila, Auburn, Kent, and Renton. Activities of the basin program are funded by revenues generated by the Green River Flood Control Zone District. The activities are also coordinated with the U.S. Army Corps of Engineers. The GRIA sets guidelines for future pumped discharges into the Green River and levee improvements; assigns interior drainage responsibilities; and provides technical leadership, public safety, and welfare through a levee monitoring system, emergency operations, a flood warning system, and cost sharing. This program funds the operation and maintenance of the P-17 stormwater pump station in the city of Tukwila.

This program is also identified as a funding source for the Duwamish riverbank stabilization projects identified in the city's current capital improvement plan.

### Permit Fees

The city collects permit fees for new development and redevelopment proposals. These permit fees cover some of the time spent by engineering staff to review stormwater plans. However, according to city staff, the fee collected does not usually cover the actual cost of the reviews.

### Summary

In general, the priority for the city's stormwater utility revenue (projected at approximately $2.1 million in 2000) is to fund stormwater operations and maintenance, debt service, and engineering. After these program activities are funded, the remaining revenue is available for constructing capital improvements.

As noted previously, new and pending federal regulations are likely to result in increased demands on the stormwater utility. The following section discusses several options for secondary sources of revenue.

# Secondary Funding Options

## State and Federal Grants and Loans

A number of state and federal programs offer grants or loans for qualifying projects (usually capital improvements). These grants and loans should be sought out as a secondary funding source. It is important to note that competition for funding is vigorous, and successful acquisition of this funding cannot be ensured.

### *The Flood Control Assistance Account Program*

The Flood Control Assistance Account Program (FCAAP), administered by Ecology, assists local jurisdictions in comprehensive planning and maintenance efforts to reduce flood hazards and flood damages. To be eligible for grant funding, flood hazard management activities must be approved by Ecology and the Washington Department of Fish and Wildlife (WDFW). In addition, local jurisdictions must participate in the National Flood Insurance Program (NFIP).

Grants are available for the following activities:

- Comprehensive flood hazard management plans (including surface water management plans and stormwater management plans) (up to 75 percent funding)
- Flood damage reduction projects and studies control management projects (up to 50 percent funding)
- Emergency flood control projects (up to 80 percent funding)
- Flood warning systems (up to 75 percent funding)
- Bioengineered bank stabilization projects (up to 50 percent funding)
- Public awareness programs (up to 75 percent funding).

A total appropriation of $4 million is made to the flood control assistance account for each fiscal biennium (July 1 of odd-numbered years). Of this appropriation, up to $500,000 may be allocated to any one county, including all jurisdictions within that county.

### *Washington Department of Ecology's Water Quality Financial Assistance*

Ecology's water quality program administers three major funding programs that provide grants and low-interest loans for projects that protect and improve water quality in Washington state. Ecology acts in partnership with state agencies, local governments, and Indian tribes by providing financial and administrative support for their water quality management efforts. To the extent possible, Ecology manages the three programs as one; there is one funding cycle, application, and offer list for the following programs:

- The Centennial Clean Water Fund (CCWF) provides grants and low-interest loans to construct wastewater treatment facilities and funds activities to reduce nonpoint sources of water pollution.
- The State Revolving Loan Fund (SRF) provides low-interest loans to construct wastewater treatment facilities and related activities, or to reduce nonpoint sources of water pollution.
- The Section 319 Nonpoint Source Grants Program (Section 319) provides grants to reduce nonpoint sources of water pollution.

These programs fund the following types of project:

- Planning, design, and construction of wastewater and stormwater treatment facilities
- Combined sewer overflow reduction
- Stream and salmon habitat restoration
- Local loan funds to repair or replace onsite sewer systems or implement agricultural best management practices
- Water reuse planning and facilities
- Watershed planning
- Water quality monitoring
- Lake restoration efforts that focus on pollution prevention
- Wellhead protection
- Acquiring wetland habitat for preservation
- Construction of public boat pump-outs
- Public information and education.

Grant and low-interest loan combinations may be available for up to 100 percent of eligible project costs. Grants for constructing point source facilities are available for up to 50 percent of eligible project costs. Grants for nonpoint source activities are available for up to 75 percent of eligible project costs. Grants for non-site-specific planning (such as comprehensive sewer and stormwater planning or watershed planning) are available for 75 percent of eligible project costs. Loans may be used to provide the grant match.

Loans are available for up to 100 percent of eligible project costs. On private property, only loans may be obtained for site-specific facilities planning and design, land acquisition,

installation of collection sewers and side sewers, and implementation projects (e.g., best management practices for landowners).

Through the Centennial Clean Water Fund, Ecology anticipates that $11.7 million will be available in competitive grants and loans for point source and nonpoint source projects in fiscal year 2001. The state legislature has approved another $5 million in grants, the use of which is limited to facilities and projects located in small towns. Approximately $1.8 million more will be available as competitive grants for nonpoint source projects from Section 319 in fiscal year 2001. Subject to congressional action, Ecology expects to have approximately $62 million available from the State Revolving Loan Fund for low-interest loans in fiscal year 2001.

### *Public Works Trust Fund*

The Public Works Trust Fund (PWTF), administered by the Washington Department of Community, Trade, and Economic Development, is a revolving loan fund that funds the "repair, replacement, rehabilitation, reconstruction or improvement of eligible public works systems to meet current standards for existing users and may include reasonable growth as part of this project." Projects designed to serve future growth are not eligible for PWTF funding. PWTF offers four loan programs:

- Construction program
- Pre-construction program
- Emergency loan program
- Public works planning loan program.

For construction loans, jurisdictions with populations less than 100,000 are eligible for up to $7 million per biennium. Loan terms of up to 20 years are available at rates that vary, depending upon the amount of local participation. Loans are at 1 percent interest for a 30 percent local match; 2 percent interest for a 20 percent local match; and 3 percent interest for a 10 percent local match. For pre-construction loans, up to $1 million per jurisdiction per biennium is available, with a 5-year repayment term that can be converted to a 20-year payback if construction funding is secured. Interest rates depend on the amount of the local match.

### *The Natural Resources Conservation Service (formerly the Soil Conservation Service)*

The Natural Resources Conservation Service (NRCS) developed the *West Side Green River Watershed Work Plan* in the 1960s. This plan and subsequent updates recommended specific measures to manage surface water runoff and control flooding in the Tukwila/Auburn valley area east of the Green River. The P-17 pump station was funded under this program. Flood hazard reduction projects proposed in the valley portion of Tukwila may be eligible for funding if they are consistent with the NRCS plan. The NRCS is coordinating with the city of Renton, which is currently performing design work on the widening of Springbrook Creek.

The West Side Green River Watershed Project (WSGRWP) was declared inactive by NRCS in the 1980s during preparation of an update to the economic analysis performed by NRCS.

Reactivating the WSGRWP would require a local sponsor, such as the city of Tukwila, to coordinate with NRCS and update the economic analysis. The economic analysis would have to show a benefit/cost ratio meeting the program requirements.

The program funds $30 million per year nationwide, and numerous projects are already defined as eligible projects awaiting funding. Funding is very competitive, although the local NRCS office is supportive of local requests for funding.

### *U.S. Army Corps of Engineers*

The Corps of Engineers Ecosystem Restoration Project may begin a nationwide program that would provide funding and other assistance for stream and river restoration. It may be possible to work with the Corps to obtain this funding or other assistance on applicable projects.

### *Federal Emergency Management Agency (FEMA)*

The state of Washington administers hazard mitigation grants for jurisdictions affected by a federally declared disaster. The federal money is appropriated through FEMA and must be applied for following each event. The amount of the annual appropriation varies with the magnitude of the disaster(s). However, a jurisdiction in an affected county may apply for relief whether or not it was affected by the disaster in question. There is a specified time period following a disaster within which one may apply. It may be possible to apply for and receive hazard mitigation grants for projects designed to protect life and property where there have been prior disasters.

### *New Programs*

Several new grant and loan programs to aid communities with salmon recovery are becoming available through the state of Washington. Many of these programs are about to begin, and most are intended for capital projects to remove fish barriers and provide additional habitat in fish-bearing streams. Some of these programs are listed below.

#### *Salmon Recovery Funding Board*

WDFW grant funding decisions are made by the agency's Salmon Recovery Funding Board (SRFB), a panel of experts concerned with getting the most benefit for the enhancement dollars. As a result, fisheries enhancement projects funded by WDFW grant monies involve different cost/benefit parameters than do projects funded through other sources. Grant funding for salmon enhancement projects has increased dramatically in the past two years, but so has the competition for such funding, and the bar is expected to rise even higher during the next funding cycle.

On December 8, 1999, WDFW concluded the comment period the need for predesign for salmon habitat projects. The SRFB's purpose in promoting predesign work is to sponsor more appropriate, better-developed, and more cost-effective enhancement projects. This will further

increase the quality of grant applications and make thorough and effective predesign analysis even more critical than it has been in the past. It is likely that only the most practical, well-developed projects with the highest margin of return related to fish enhancement will be funded. Therefore, maximizing fisheries benefits on a per-unit-cost basis must be a critical element in determining the feasibility of alternatives.

*Washington Department of Natural Resources 2000 Aquatic Lands Enhancement Account*

This grant program supports aquatic lands enhancement projects for the purchase, improvement, or protection of aquatic lands for public purposes; for providing and improving access to such lands; and for volunteer cooperative fish and game projects. Grant applications were accepted until May 1, 2000. If approved, the funding would become available July 1, 2001. This grant program is on a biannual budgeting cycle.

*Washington State Fish Passage Grant Program*

The state requested $12 million in May 1999 for projects to be funded in 2000. The program focuses on improving fish passage. (The contact is Cliff Hall, grant program manager, Washington Environmental Affairs Office, (360) 705-7499.)

## Potential Secondary Funding Sources within the City of Tukwila

The following paragraphs describe other potential secondary funding sources that the city could establish, and modifications to funding sources that could be considered within the city's existing framework of fee collection.

### *Plan Review and Inspection Fees*

According to city staff, permit fees presently collected do not cover the actual costs involved in reviewing the drainage aspects of development proposals and performing field inspections. These fees should be increased to directly cover the costs of those activities related to drainage review.

### *Capital Facilities/Connection Charges*

Capital facilities charges (CFCs) are one-time charges assessed at the time of development or redevelopment to recover a proportionate share of a utility's capital investment, including the costs of both existing facilities and planned future facilities. The applicability of capital facilities charges depends on 1) how existing facilities were funded, and 2) the city's interpretation of state law regarding future facilities costs (legal opinions by other city attorneys have validated the inclusion of future facilities costs in the CFC calculation). Capital facilities charges, if applicable, would provide a revenue stream from new development or redevelopment (for developments not having previously paid the CFC) to be used for capital construction and related

costs. Because these are development-related fees, the stability of fee revenues depends upon growth occurring as anticipated.

Capital facilities charges, or connection charges, are charges imposed as conditions of service to recover an equitable share of capital investment incurred by a utility. The two basic elements of a capital facilities charge are the general facilities charge (GFC) and the system development charge (SDC). The GFC is based on the cost of existing facilities, while the SDC is based on the estimated costs of planned future capital improvements.

The intent of the general facilities charge is to provide an instrument for new development to buy into the cost borne by the ratepayers for existing facilities. Of the two components, the general facilities charge is most clearly and explicitly authorized in the applicable state statute (RCW 35.92.025). However, only those capital costs previously incurred by the stormwater utility ratepayers are appropriate for inclusion in the charge. The city's stormwater infrastructure has been built through a combination of developer contributions, general fund tax sources, and the utility fees since 1990. Developer-donated assets have had no impact on existing ratepayers, and the cost is not recoverable in the charge. Because the city charges for an undeveloped property, ratepayers have already paid for a share of the existing system through taxes and utility fees, and it is not equitable to require them to invest again. In short, it is most likely that the city has little or no basis for a general facilities charge.

The statute (RCW 35.92.025) does not explicitly allow or disallow a charge that includes future capital costs (i.e., the system development charge). While several cities have incorporated a system development charge, other cities have been reluctant to include the charge without specific authorization. It is recommended that the Tukwila city attorney investigate the question and write an opinion on the defensibility of system development charges. Many stormwater utilities in western Washington collect a system development charge.

It is also recommended that the city consider a capital facilities charge made up entirely of the system development charge component. The system development charge calculation is relatively straightforward the cost of facilities planned for construction over the study period is divided by the expected customer base at the end of the study period.

### *Local Improvement Districts or Other Assessment Districts*

Most commonly structured as local improvement districts (LIDs), these funding mechanisms generally assess individual properties directly benefited or served by a specific capital improvement. These benefited properties share in the cost of that facility.

A local improvement district may be initiated by legislative action (by the applicable jurisdiction) or by petition, but ultimately requires the assent of benefited property owners for implementation. If it is initiated by petition, a simple majority of benefited property owners must sign the final petition. In either case (legislative action or petition), if property owners representing 60 percent of the amount to be assessed file protests, the local improvement district may not be formed.

Local improvement districts are an equitable way of recovering costs from those directly benefited, although assigning benefit may be difficult. In general, the special benefit to the property is defined as the difference between the fair market value of the property before and after the improvement. Local improvement districts may present administrative challenges due to the funds tracking required to account for a number of separate parcels. Implementation can be cumbersome and risky, depending on the formation process undertaken. Local improvement districts work best when used to fund specific local improvements. Regional facilities create problems with both the allocation of the project cost to individual benefiting properties and the additional administrative burden.

### *Conventional Debt Instruments*

The most commonly used long-term debt instruments are revenue and general obligation bonds. Bond anticipation notes are available for short-term interim capital financing. Issuing debt can be used for capital funding only, not operations.

Revenue bonds are the most common source of funds for construction of major utility improvements. Revenue bond debt service is paid out of utility rate and capital facilities charge revenues. There are no statutory limitations on the amount of revenue bonds a city can issue, although the utility is required to meet a yearly net operating income coverage requirement of up to 1.5 times the annual debt service. The terms on revenue bonds are not as favorable as general obligation bonds, but they carry the advantage of leaving the city's debt capacity undisturbed. Interest rates vary depending on market conditions.

General obligation bonds are secured by the taxing power of the city and are typically paid through property tax revenues. However, the city may choose to repay the debt from utility revenues, using property tax revenues only if the utility fails to meet its debt obligation. The financing costs of general obligation bonds are lower than for revenue bonds, due to 1) lower interest rates available, 2) no coverage requirements, and 3) no reserve requirements.

Short-term interim financing mechanisms are also available to meet capital costs. Bond anticipation notes can provide interim financing during construction while allowing flexibility in the choice of long-term financing instruments. Typically, bond anticipation notes have lower interest rates than bonds, but they add to issuance costs.

### *Interjurisdictional Cost Sharing*

Surface water runoff does not follow corporate boundaries and often passes from one jurisdictional entity to another. Portions of the city of Tukwila receive and convey runoff from King County, the cities of SeaTac and Seattle, the Port of Seattle, and the Washington State Department of Transportation. Runoff from the city of Tukwila similarly passes through other jurisdictions such as the city of Renton. Forming interlocal agreements to share the cost of capital projects that may serve several jurisdictions is possible.

An excellent example of an interjurisdictional effort is the Des Moines Creek Basin Program. Through an ongoing interlocal agreement, King County, the cities of Des Moines and Tukwila, and the Port of Seattle funded the preparation of a basin plan. The plan identifies problems and recommended solutions in the overall basin. Through this interjurisdictional effort, a plan was developed for addressing water quality issues, developing prioritized capital improvement project recommendations, and cooperative funding. The plan recommends over $6 million worth of capital improvements that are to be funded through cost sharing. The cost sharing is based upon both the fraction of the basin area within each jurisdiction and the fraction of the total impervious surface area in the basin within each jurisdiction. A basin committee, with representation from each jurisdiction, was formed to meet regularly and work toward implementation of the capital projects.

Similar opportunities exist for the city of Tukwila, in particular the Gilliam Creek basin. The city of SeaTac and the Washington State Department of Transportation make up a substantial portion of the basin.

### *Fees in Lieu of Onsite Construction*

Fees in lieu of onsite construction allow developers to pay a fee to the city instead of constructing onsite stormwater facilities to meet development or redevelopment requirements. The fee must be used by the city to build regional or onsite facilities designed to meet the same objectives as the onsite requirements. Like capital facilities charges, fee proceeds are available for capital facilities only, and their reliability depends on the consistency of growth and redevelopment.

For redevelopment, the development community would likely prefer paying a fee instead of redeveloping the drainage infrastructure at a site, because it is very costly to retrofit a redevelopment site to provide stormwater quantity and quality controls. Current city code requires redevelopment to provide water quality treatment facilities for the entire site if the project cost is greater than $500,000 (or $100,000 for a high-use site). But it may be difficult for the city to locate a suitable site for those controls if the area is highly developed. There are also disadvantages with timing. To be in compliance with stormwater regulations, any regional facility must be operational by the time the initial development is complete. This would require the city to construct a regional facility prior to completion of any new development that is planning to use the facility. If the city is intending to use the initial fee as only a portion of the cost to build a regional facility, the city would need to secure the remaining financing in advance to build the project. The costs could be paid off as subsequent development pays the fee. Unless a unique set of circumstances favors this approach, this method should not be considered a reliable secondary funding source.

### *Developer Participation*

*Developer participation* describes an approach in which a developer either constructs or helps fund a capital improvement project as a condition of development. In some cases, the city gains by reducing the cost to ratepayers and the developer gains by speeding the process of making

land developable. For example, a developer could construct a "public" stormwater management facility or a storm drainage conveyance capacity improvement project, as identified in an adopted capital improvement plan, and thus should be eligible for reimbursement. The amount of reimbursement should be limited to the proportionate cost of providing capacity over and above that needed by the developing property. This option should be available for both water quality and water quantity improvements. A developer who constructs a conveyance system or a regional facility may be eligible for a latecomer agreement. The following discussion of latecomer agreements is broken down into areas, conveyance systems, and regional control facilities.

***Latecomer Fees – Conveyance Systems***

In addition to (or instead of) providing onsite stormwater control facilities, commercial, institutional, industrial, and multifamily developers may be required to provide or upsize the conveyance system serving their parcels. To the extent that the developer increases conveyance capacity beyond the capacity needed to serve his parcel, then the city may allow the developer to recover the cost of upsizing by charging a latecomer fee.

To recover these added costs for upsized facilities, the developer (or city acting for the developer) could charge a latecomer fee. This fee is assessed to other parcels that will be served by the conveyance capacity provided by the initial developing property. The proceeds of the latecomer fees would be remitted to the initial developer as a reimbursement for constructing additional conveyance capacity.

The following formula is an example of charges assessed latecomers for the reimbursement of customers who have provided conveyance capacity that exceeds their property-specific requirements and is available to serve subsequently developing properties:

$$L = M \ x \ \frac{(Ca - Cr)}{Ca} \ / \ D$$

where:

L = charge per front foot to latecomers to be collected by city or developer and remitted to the provider of additional conveyance capacity (less 10 percent for processing)

M = cost of project (conveyance only)

Ca = capacity added to existing or non-existing conveyance system

Cr = capacity required to meet post-development conveyance demands of credit applicant

D = developable front footage to be served by additional conveyance capacity.

Reimbursement under this approach is limited by statute (RCW 35.91.020) to 15 years.

### *Latecomer Fees – Regional Stormwater Control Facilities*

Establishing a latecomer agreement for a regional stormwater control facility is administratively complex, in part due to the difficulties of determining an equitable method to charge future developing properties (similar to local improvement districts). Some of the difficulties include:

- If the drainage area tributary to the regional facility is partially developed, (as is most of the city), it would be made up of both undeveloped and developed properties. Thus it would be difficult to develop a formula to arrive at a cost to pay back the original developer, because it would be difficult to predict the extent to which future development in combination with redevelopment would occur. This prediction would be necessary to arrive at a total future improvement area and equitable cost that would be charged to future development.

- Due to the timing of both development and redevelopment, it would be uncertain when and to what extent the original developer would be reimbursed, within the statutory time limit of 15 years.

- Other developing or redeveloping areas within the same tributary drainage area could choose to build an onsite facility rather than participate in a regional facility.

For these reasons, a latecomer agreement for regional facilities should not be considered as a reliable secondary funding source.

## Summary

The purpose of this review was to identify potential funding mechanisms to supplement the primary utility service fee and finance capital improvements. Following are some conclusions and recommendations developed during this review.

- The city of Tukwila should continue to pursue applicable grants and loans. These special funding sources, although difficult to obtain, can significantly reduce the city's costs for capital projects.

- The city should implement a system development charge for new development and redevelopment. This one-time charge would provide funding for future capital projects.

- The city should increase permit review fees to directly cover the cost of staff effort on development review.

- The city of Tukwila should seek opportunities to form cost sharing opportunities with other jurisdictions. The city of SeaTac and the Washington State Department of Transportation are responsible for a significant portion of the Gilliam Creek basin. The city of Tukwila should also continue to leverage cost sharing through the Green River Basin Program.

- Under favorable circumstances, the city could encourage developer participation in regional stormwater facilities. However, in highly developed basins, this should be approached with caution. In the already highly developed Gilliam Creek basin, there are few sites remaining for regional detention and water quality treatment. Therefore, the city may wish to concentrate on using these sites for retrofitting areas with undetained and untreated runoff, and encourage developers to provide detention and treatment within their parcels.

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